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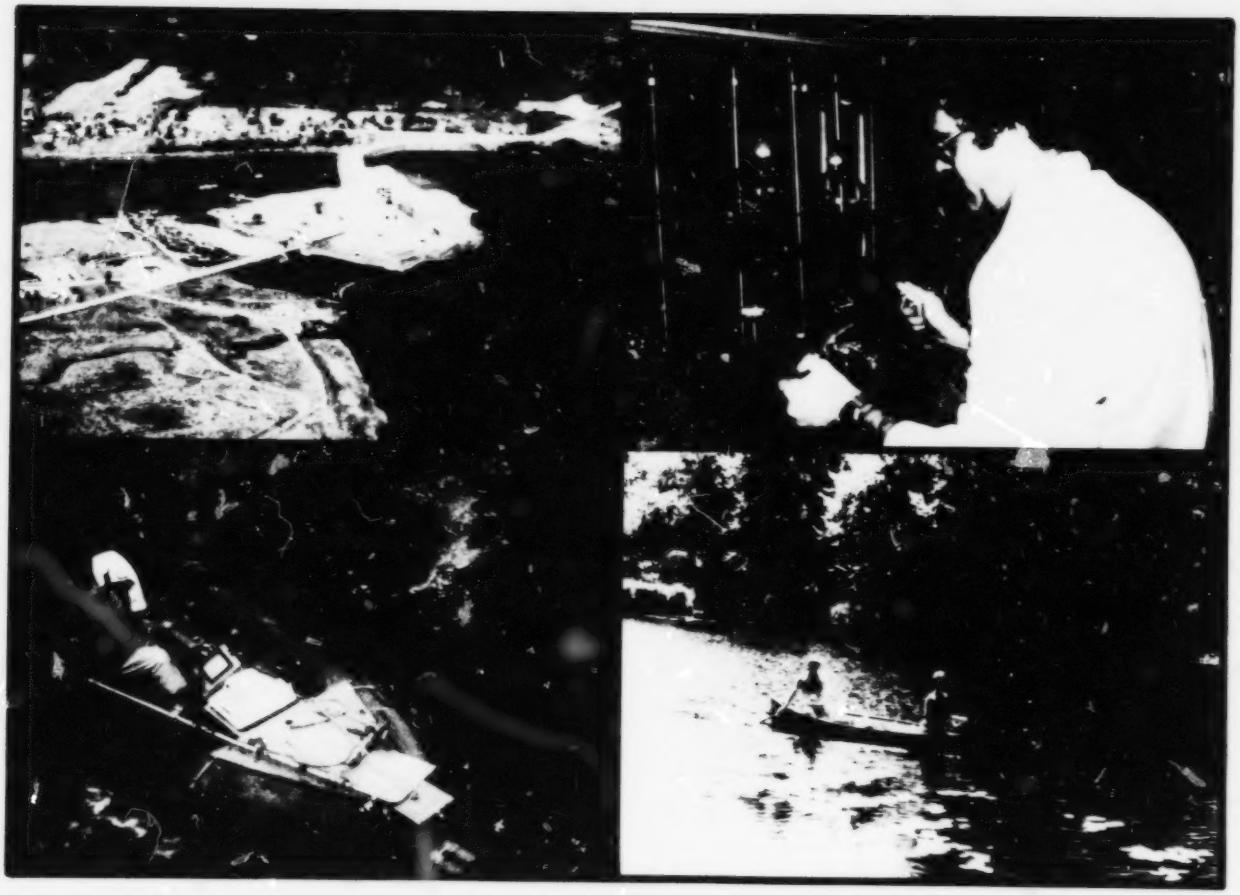

Canada

INLAND WATERS DIRECTORATE
ATLANTIC REGION
WATER RESOURCES BRANCH
DARTMOUTH, NOVA SCOTIA

PERFORMANCE EVALUATION

OF

BRISTOL AEROSPACE HYDROMET DCPS

IN THE

ATLANTIC REGION - 1986

by

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WATER RESOURCES BRANCH

INLAND WATERS AND LANDS

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SUMMARY

1986 saw the National DCP Network Expansion Program near completion in the Atlantic Region with the installation of 8 new Bristol Hydromet DCPs, bringing to 18 the number of installed and activated units. The activation of a platform early in 1987 at the Grandy Brook gauging station completed the program.

Another component to the program was added with the acquisition of 14 additional Hydromet DCPs for the use of the Province of Newfoundland. Water Resources Branch agreed to purchase the equipment in exchange for Newfoundland agreeing to lease the service for 10 years on an initial cost recovery basis. Already, 10 of these platforms have been deployed and the other 4 will be in 1987.

The reliability of the Bristol Hydromet DCP was further demonstrated with another year of close monitoring. Also, a significant drop in the number of lost transmissions (less than 9% in 1986) was observed, indicating the initial installation lapses have been overcome.

SOMMAIRE

Lors de l'année 1986, le Programme national d'expansion du réseau de PCD fut en grande partie complété dans la Région de l'Atlantique. Huit nouvelles plate-formes Bristol Hydromet furent installées, ce qui porte à dix-huit le nombre de celles-ci déployées. Lorsque la station de jaugeage du Ruisseau Grandy sera dotée d'une plate-forme tôt en 1987, le programme prendra ainsi fin.

Cependant, une autre composante fut ajoutée au programme avec l'achat de quatorze autres plate-formes Hydromet pour la province de Terre-Neuve. Le coût de cet achat fut couvert par la Direction des ressources en eau avec l'entente que Terre-Neuve, en échange pour l'utilisation des plate-formes, s'acquitterait du coût en versant des annuités echelonnées sur dix ans. Déjà dix de ces plate-formes sont installées et les quatre autres le seront en 1987.

Une autre année d'observations a pu confirmer le bon fontionnement des plate-formes Bristol Hydromet. De plus, une diminution marquée du nombre de transmissions ratées (moins de 9% pendant l'année) indiquerait que les premières bévues d'installation ont été largement surmontées.

INTRODUCTION

In an attempt to further increase the efficiency of its hydrometric network and to broaden its capability in responding to the users' real time data needs, the Water Resources Branch decided a few years ago to equip over a five year period, 350 of its gauging stations with Bristol Aerospace Hydromet data collection platforms (DCPs). The Atlantic Region was allocated 19 of these platforms with remote, fly in stations in Labrador and on the Island of Newfoundland being the primary targets for these units.

The DCPs were purchased by WRB Headquarters via tendering contract with the Bristol Aerospace company in Winnipeg, Manitoba. The first shipment of platforms for the Atlantic Region was received in 1983 and installation began in 1984. The purchase and installation of the Bristol DCPs in the Atlantic Region was to be completed over a 3 year period.

GOES NETWORK

The Bristol Aerospace Hydromet DCPs as well as the vast majority of the other DCPs transmit via the Geostationary Operational Environmental Satelites (GOES) network operated by the National Environmental Satelite Data and Information Service (NESDIS) in Suitland, Maryland. Figure 1 gives a schematic view of how the DCPs interact with the GOES satelite and how the signal is transmitted to the Ground Receiving Station (GRS) in Wallops Island, Va. The data are then retrieved daily by Ottawa HQ via an autodial telephone line.

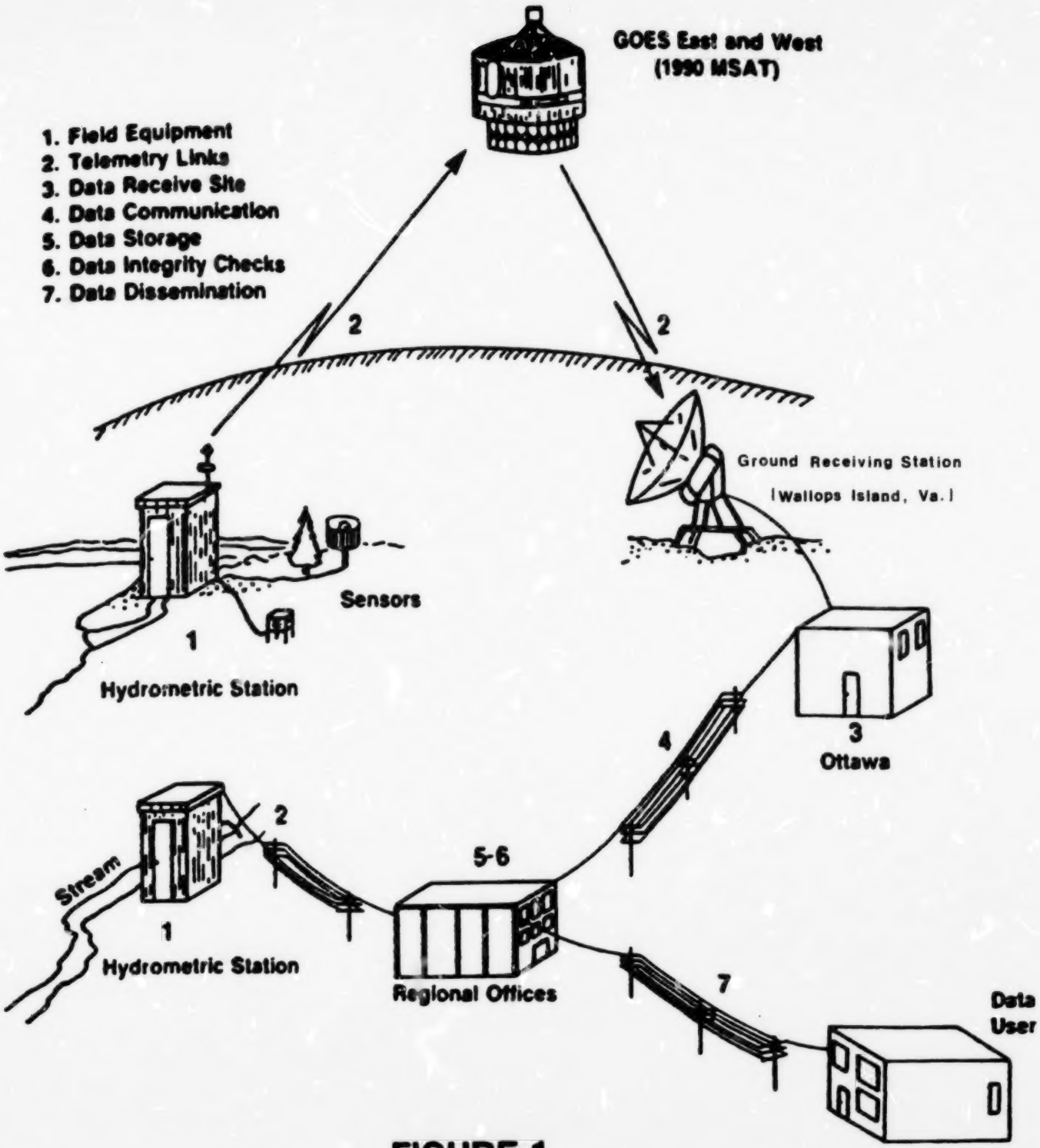


FIGURE 1

WRB Real Time Data Handling System

DCP NETWORK EXPANSION IN 1986

The Water Resources Branch, Atlantic Region, continued in 1986 to equip surface water data monitoring stations with satelite technology. As of the end of 1986, the Branch owned and operated in the Region 32 DCP units and also provided field servicing to 10 additional units. As a result of the purchases over the last 3 years, a marked preponderance of the platforms are now from Bristol. There are 28 activated Bristol Hydromet DCPs operating in the Region. See Table I for a listing of the Bristol Hydromet DCPs and Table II for a listing of the other DCPs operated by WRB in the Atlantic Region. Figures II, III, and IV show the locations of those DCPs. Other brand names in use, mainly in the Saint John River Basin, are LaBarge, Handar, Magnavox, and Ball Brothers.

During the past year, a total of 18 Bristol Hydromet DCPs were installed. The greatest number went to Newfoundland with 11, then 4 in Labrador, 2 in New Brunswick, and 1 in Nova Scotia. In the mean time a few additions and adjustments were made to the Saint John River Forecast Centre DCP network, the major change being the conversion of LaBarge units in Maine to Handar. The installation of one more Bristol unit at the Grandy Brook gauging station in January, 1987 will bring to a close the National DCP Expansion Program undertaken 3 years ago. The Atlantic Region allocation of 19 will then be fully deployed.

Parallel to the National Program, WRB procured 14 additional Bristol DCPs for use by the Province of Newfoundland. Ten of these DCPs have to date been installed. The other 4 platforms will be installed in 1987. WRB has fronted the capital for purchasing these units and has negotiated with the province a 10 year lease of the equipment to recover the cost incurred.

TABLE I

HYDROMETRIC STATIONS EQUIPED WITH BRISTOL HYDROMET DCPs ATLANTIC REGION - 1986

PROVINCE/ LOCATION	DCP ID	USER	FILE	CH	TIME SLOT
NEW BRUNSWICK					
Northwest Miramichi R.	45517A64	WRB	WSCFTN	19	0125
Point Wolfe R.	48169244	WRB	WSCFTN	9	0109
Tracadie R.	45518D7E	WRB	WSCFTN	19	0027
Upsalquitch R. (TYP)	481402D2	WRB	WSCFTN	9	0002
NEWFOUNDLAND					
Bartletts Br.	48125260	NFDOE	WSCHAL	3	0024
Bay du Nord R.	4812977E	NFDOE	WSCHAL	3	0028
Exploits R. (Noel Paul)	4816C238	WRB	WSCHAL	9	0114
Gander R. (TYP)	4814253E	WRB	WSCHAL	9	0004
Great Rattling Br.	48124116	NFDOE	WSCHAL	3	0023
Grey R.	4816D14E	WRB	WSCHAL	9	0117
Harrys R.	481224FO	NFDOE	WSCHAL	3	0021
Humber R.	4812116A	NFDOE	WSCHAL	3	0020
Isle aux Morts R. (TYP)	48123786	NFDOE	WSCHAL	3	0022
Main R.	4816B4A8	WRB	WSCHAL	9	0113
Rocky R. (TYP)	481267FA	WRB	WSCHAL	3	0025
St. Shotts R.	4812748C	NFDOE	WSCHAL	3	0026
Terra Nova R.	4812E1EE	NFDOE	WSCHAL	3	0033
Tides Br.	48128408	NFDOE	WSCHAL	3	0027
Upper Humber R. (TYP)	481402D2	WRB	WSCHAL	9	0007
LABRADOR					
Alexis R.	481452AE	WRB	WSCHAL	9	0009
Churchill R.(ab Muskrat)	481441D8	WRB	WSCHAL	9	0008
Eagle R.	4560B522	WRB	WSCHAL	13	0228
Kanairiktok R.	48146734	WRB	WSCHAL	9	0012
Little Mecatina R.	4816B4A8	WRB	WSCHAL	9	0112
Minipi R.	4540F7C6	WRB	WSCHAL	13	0012
NOVA SCOTIA					
Kelley R. (TYP)	4814243E	WRB	WSCHAL	9	0003
NE Margaree R. (TYP)	4816E4D4	WRB	WSCHAL	9	0118
Round Lake Br.	454183AC	WRB	WSCHAL	19	0026

NFDOE - Newfoundland Department of the Environment
TYP - WRB Typical station for monthly surface runoff summary.
WRB - Water Resources Branch, IW/L

TABLE II

OTHER DCP INSTALLATIONS SERVICED BY WRB IN THE ATLANTIC REGION -1986

PROVINCE/STATE LOCATION	DCP ID	MAKE	OWNER	USER	FILE	CH	TIME SLOT
MAINE							
Allagash R.	455167C0	Handar	USGS	RFC	WSCFTN	19	0122
Big Black R.	455174B6	Handar	USGS	RFC	WSCFTN	19	0124
Saint John R. @ Dickey	4550EDFC	Handar	USGS	RFC	WSCFTN	19	0107
Saint John R. @ Ft. Fent	45413022	LaBarge	RFC	RFC	WSCFTN	13	0020
Saint John R. @ 9 Mile	4541181C	Handar	USGS	RFC	WSCFTN	13	0017
St. Croix R. @ Calais	4540BA1E	LaBarge	WQB	WQB	WSCHAL	13	0259
NEW BRUNSWICK							
Big Presque Isle Str.	45417DFA	Handar	WQB	WQB	WSCHAL	19	0025
Dennis Str.	4560A654	Ball Br	WRB	WRB	WSCFTN	13	0232
Grande Riv.	45516912	Handar	NBDOE	RFC	WSCFTN	19	0123
Salmon R. @ Castaway	454116CE	LaBarge	NBDOE	RFC	WSCFTN	13	0016
Shogomoc Str. (TYP)	4558B1F4	LaBarge	WRB	WRB	WSCHAL	13	0256
Stanley Mountain (AES)	15CCA5AE	Magnavox	NBDOE	RFC	WSCFTN	47	0245
St. Francis R.	4540A968	LaBarge	WRB	RFC	WSCFTN	13	0257
NOVA SCOTIA							
Cheticamp River (Argos)	00880	Bristol	WRB	NSPC	WSCHAL	--	N/A --

AES - Atmospheric Environmental Service
NBDOE - New Brunswick Department of the Environment
NSPC - Nova Scotia Power Corporation
RFC - Saint John River Forecast Centre
TYP - WRB Typical station for monthly surface runoff summary
USGS - United States Geological Survey
USWS - National Weather Service (U.S.A)
WQB - Water Quality Branch, IW/L
WRB - Water Resources Branch, IW/L

FIG. II Bristol DCP's Active in 1986

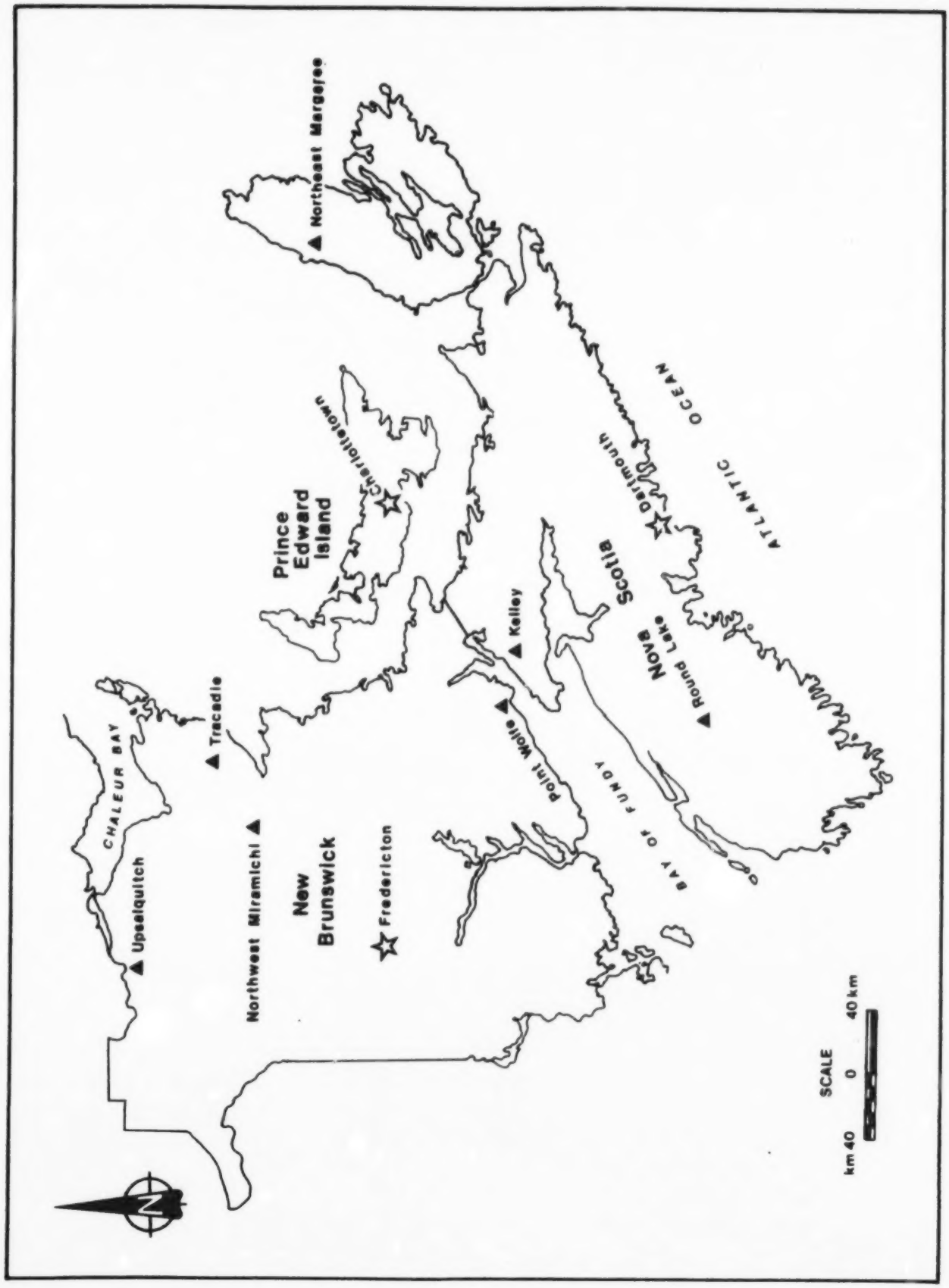


FIG. 4 Bristol DCP's Active in 1986

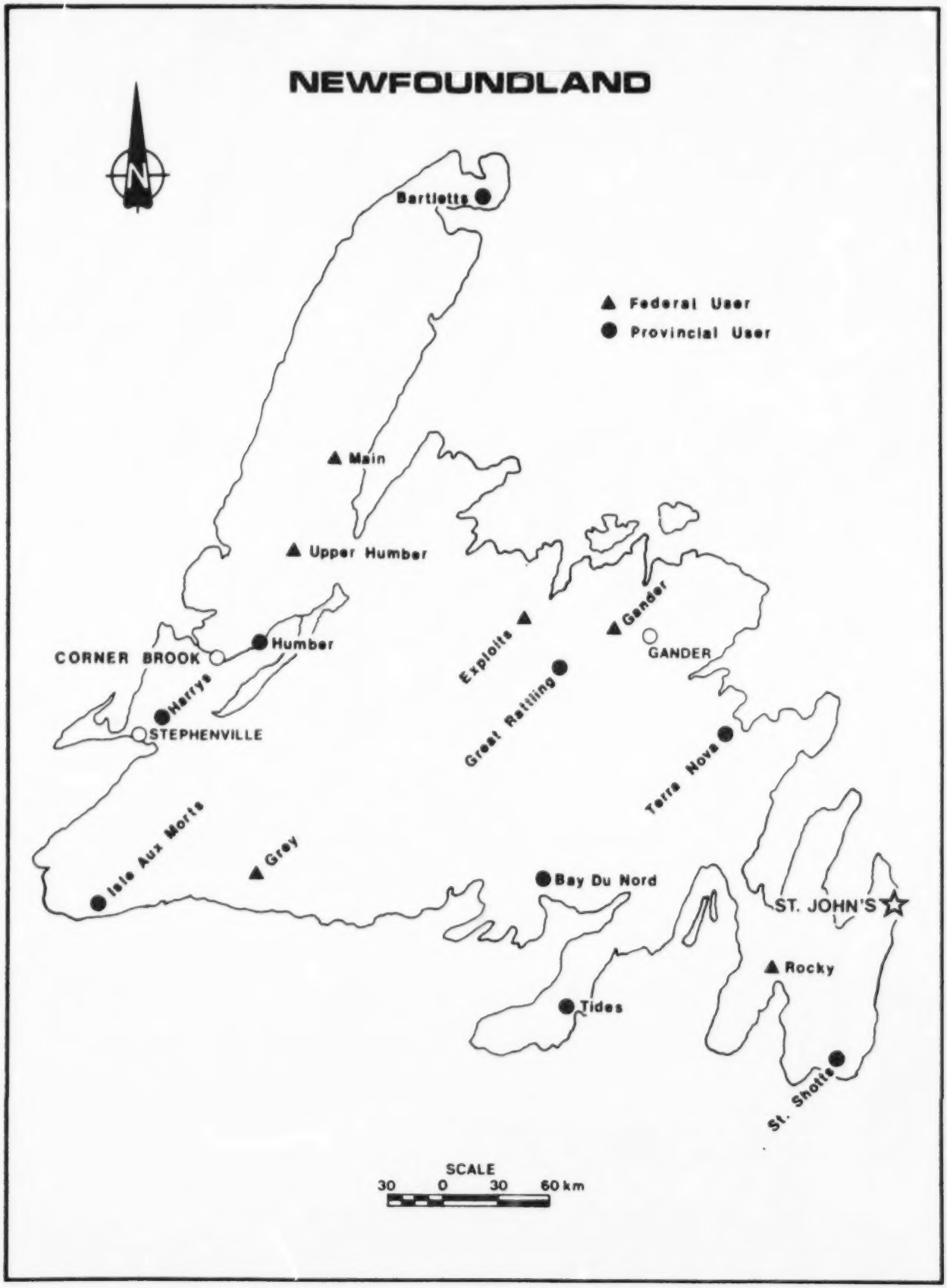
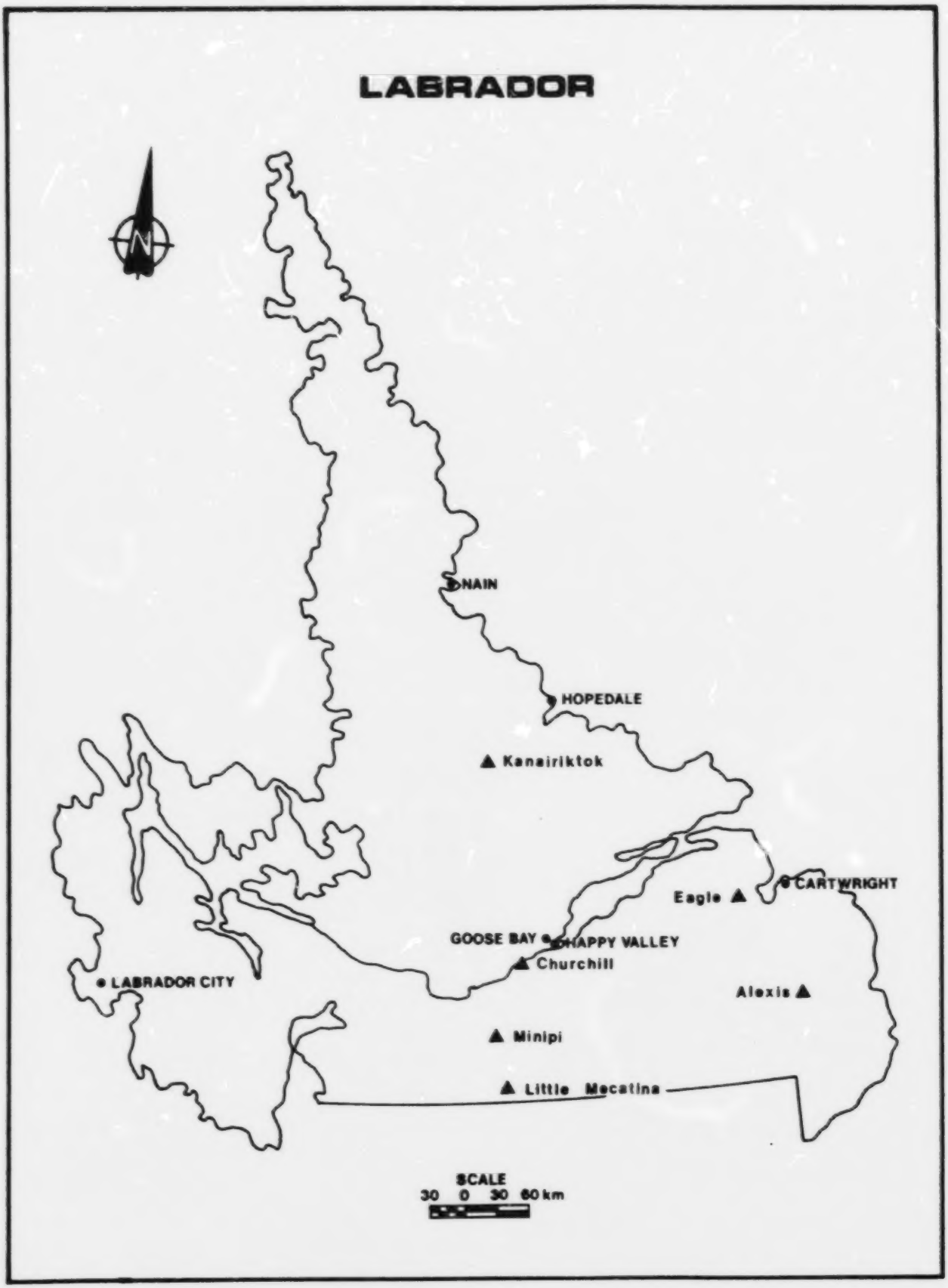


FIG. 8 Bristol DCP's Active in 1986



The Bristol DCPs have been installed at remote fly in hydrometric stations in Newfoundland and Labrador as originally intended but also at other stations for the purpose of producing real time typical data and monitoring spacial variation of runoff for field purposes. The 10 DCPs installed in Newfoundland at the request of that province were located according to provincially identified needs. Of the 19 Bristol DCPs installed under the federal program, 11 are at remote fly in sites or at sites accessible only by special purpose vehicle, 5 are at Typical stations and 3 are in areas not previously covered by real time equipment.

TRAINING

Due to the considerable expansion of the DCP network in Newfoundland, a refresher course in DCP installation, maintenance and troubleshooting was provided during the summer of 1986 to the WSC technical staff in that province. The 2-day course was given by R. Terzi of the Hydrometric Methods Section in Ottawa and D. MacNab of Bristol Aerospace. The training received was worthwhile because the technicians were immediately able to make use of it in the field while still fresh.

DCP DATA RETRIEVAL

The command file GETDATA.CMD is used via DECNET to obtain the region's DCP data from the Ottawa mini. This task is performed every work day. The command file copies the DCPWSCHAL.DAT file to an INPUT.DAT file which is in turn fed to a CLEANUP routine which packs the data together. The resulting OUTPUT.DAT is stored into a new MASTER.DCP. This DCP data file is available for input into the

DCP.FTN program which is used to obtain various data output formats. A menu provides the user with the following options:

DCP FILE MANAGEMENT MENU

0 - STOP

1 - OBTAIN AND PROCESS DCP FILES

2 - OBTAIN AND PRINT DIAGNOSTICS

3 - PRINT DIAGNOSTIC REPORT

4 - RUN DCP LISTING PROGRAM

Selecting option 4 provides the user with the following menu:

1 - ALL PLATFORMS LATEST TRANSMISSION

2 - ALL PLATFORMS ALL TRANSMISSIONS ON FILE

3 - ALL PLATFORMS IN USER ID LATEST TRANSMISSION

4 - ALL PLATFORMS IN USER ID ALL TRANSMISSIONS ON FILE

5 - ONE PLATFORM LATEST TRANSMISSIONS ON FILE

6 - ONE PLATFORM ALL TRANSMISSIONS ON FILE

7 - OUTAGE REPORT

8 - CHOOSE A CYCLE OF MASTER.DCP FOR PROCESSING

9 - LIST MESSAGES UNEXPECTED OR NOT RECEIVED

10 - TO END

An outage report is provided at the end of each run of the MASTER.DCP file or it can be selected and run independently from the main menu shown above. This report indicates outages caused by system/equipment failures external to the Water Resources Branch facilities. Another recent addition to our capability is provision of the DCP diagnostics report generated daily in Ottawa. Once a week, the accumulated diagnostic report is transfered to the Dartmouth office so it can be used to determine the need for field maintenance of the equipment.

At the end of 1986, the Dartmouth Regional Office was receiving daily data from 36 DCPs. 27 DCPs transmitted on the WSCHAL file for which the WRB Regional Office is considered the primary user and 9 transmitted on the WSCFTN file whose primary user is considered to be the Fredericton Sub-Office. Table III shows a listing of the DCPs which provide daily outputs to the Datmouth Regional Office. All 9 DCPs which show Fredericton as the primary user also output to Dartmouth as a secondary or tertiary user.

PERFORMANCE OF THE BRISTOL HYDROMET DCPS

Previous to 1986 only 10 Bristol Hydromet DCPs had been activated. The performance of these first units, as stated in the 1985 DCP Performance Evaluation Report, was found to be satisfactory. With the installation of 18 additional units it was possible to obtain a much more exhaustive appreciation of the equipment's reliability. A glance at Figures V and VI provides a positive picture. Overall, less than 9% of the total possible transmissions were not received by the Ground Receiving Station in Wallops Island, Virginia. This compares favorably with the 19% of lost transmissions last year. Reducing the amount of lost transmissions by half is indicative of the reliability of the platforms, shows the increased familiarity of the technicians with the equipment and proves the DCPs will operate in most field conditions encountered in the Atlantic Region.

The 8.8% loss rate does not even fully reflect the overall realiability of the Hydromet platform. 15 of the 28 DCPs operated throughout the year without any interuptions except for maybe an occasional flicker. Only 5 of the platforms failed to transmit at

TABLE III

DCPS WITH DAILY DATA RETRIEVAL
DARTMOUTH REGIONAL OFFICE

LOCATION	DCP ID	MAKE	OWNER	USER	FILE	CH	TIME SLOT	DAI
Alexis R. LAB	481452AE	Bristol	WRB	WRB	WSCHAL	9	0009	60
Bartletts Br., NF	48125260	Bristol	WRB	NFDOE	WSCHAL	3	0024	60
Bay du Nord R., NF	4812977E	Bristol	WRB	NFDOE	WSCHAL	3	0028	60
Big Presque Isle Str., NB	45417DFA	Handar	WQB	WQB	WSCHAL	19	0025	60
Churchill R.(ab.Muskrat), LAB	481441D8	Bristol	WRB	WRB	WSCHAL	9	0008	60
Dennis Str., NB	4560A654	Ball Br	WRB	WRB	WSCFTN	13	0232	60
Eagle R., LAB	4560B522	Bristol	WRB	WRB	WSCHAL	13	0228	60
Exploits R. (Noel Paul),NF	4816C238	Bristol	WRB	WRB	WSCHAL	9	0114	60
Gander R. (TYP), NF	4814253E	Bristol	WRB	WRB	WSCHAL	9	0004	60
Grande Riv., NB	45516912	Handar	NBDOE	RFC	WSCFTN	19	0123	60
Great Rattling Br., NF	48124116	Bristol	WRB	NFDOE	WSCHAL	3	0023	60
Grey R., NF	4816D14E	Bristol	WRB	WRB	WSCHAL	9	0117	60
Harrys R., NF	481224F0	Bristol	WRB	NFDOE	WSCHAL	3	0021	60
Humber R., NF	4812116A	Bristol	WRB	NFDOE	WSCHAL	3	0020	60
Isle aux Morts R. (TYP), NF	48123786	Bristol	WRB	NFDOE	WSCHAL	3	0022	60
Kanairiktok R., LAB	48146734	Bristol	WRB	WRB	WSCHAL	9	0012	60
Kelley R. (TYP), NS	4814243E	Bristol	WRB	WRB	WSCHAL	9	0003	60
Little Mecatina R., LAB	4816B4A8	Bristol	WRB	WRB	WSCHAL	9	0112	60
Main R., NF	4816B4A8	Bristol	WRB	WRB	WSCHAL	9	0113	60
Minipi R., LAB	4540F7C6	Bristol	WRB	WRB	WSCHAL	13	0012	60
NE Margaree R. (TYP), NS	4816E4D4	Bristol	WRB	WRB	WSCHAL	9	0118	60
Northwest Miramichi R., NB	45517A64	Bristol	WRB	WRB	WSCFTN	19	0125	60
Point Wolfe R., NB	48169244	Bristol	WRB	WRB	WSCFTN	9	0109	60
Rocky R. (TYP), NF	481267FA	Bristol	WRB	WRB	WSCHAL	3	0025	60
Round Lake Br., NS	454183AC	Bristol	WRB	WRB	WSCHAL	19	0026	60
Saint John R. @ Ft. Kent, ME	45413022	LaBarge	NBDOE	RFC	WSCFTN	13	0020	15
Salmon R. @ Castaway, NB	454116CE	LaBarge	NBDOE	RFC	WSCFTN	13	0016	15
Shogomoc Str. (TYP), NB	4558B1F4	LaBarge	WRB	WRB	WSCHAL	13	0256	30
St. Croix R. @ Calais, ME	4540BA1E	LaBarge	WQB	WQB	WSCHAL	13	0259	30
St. Francis R., NB	4540A968	LaBarge	WRB	RFC	WSCFTN	13	0257	15
St. Shotts R., NF	4812748C	Bristol	WRB	NFDOE	WSCHAL	3	0026	60
Terra Nova R., NF	4812E1EE	Bristol	WRB	NFDOE	WSCHAL	3	0033	60
Tides Br., NF	48128408	Bristol	WRB	NFDOE	WSCHAL	3	0027	60
Tracadie R., NB	45518D7E	Bristol	WRB	WRB	WSCFTN	19	0027	60
Upper Humber R. (TYP), NF	481402D2	Bristol	WRB	WRB	WSCHAL	9	0007	60
Upsalquitch R. (TYP), NB	481402D2	Bristol	WRB	WRB	WSCFTN	9	0002	60

DAI - Data Acquisition Interval
NFDOE - Newfoundland Department of the Environment
RFC - Saint John River Forecast Centre
WQB - Water Quality Branch, IW/L
WRB - Water Resources Branch, IW/L
TYP - WRB Typical station for monthly surface runoff summary.

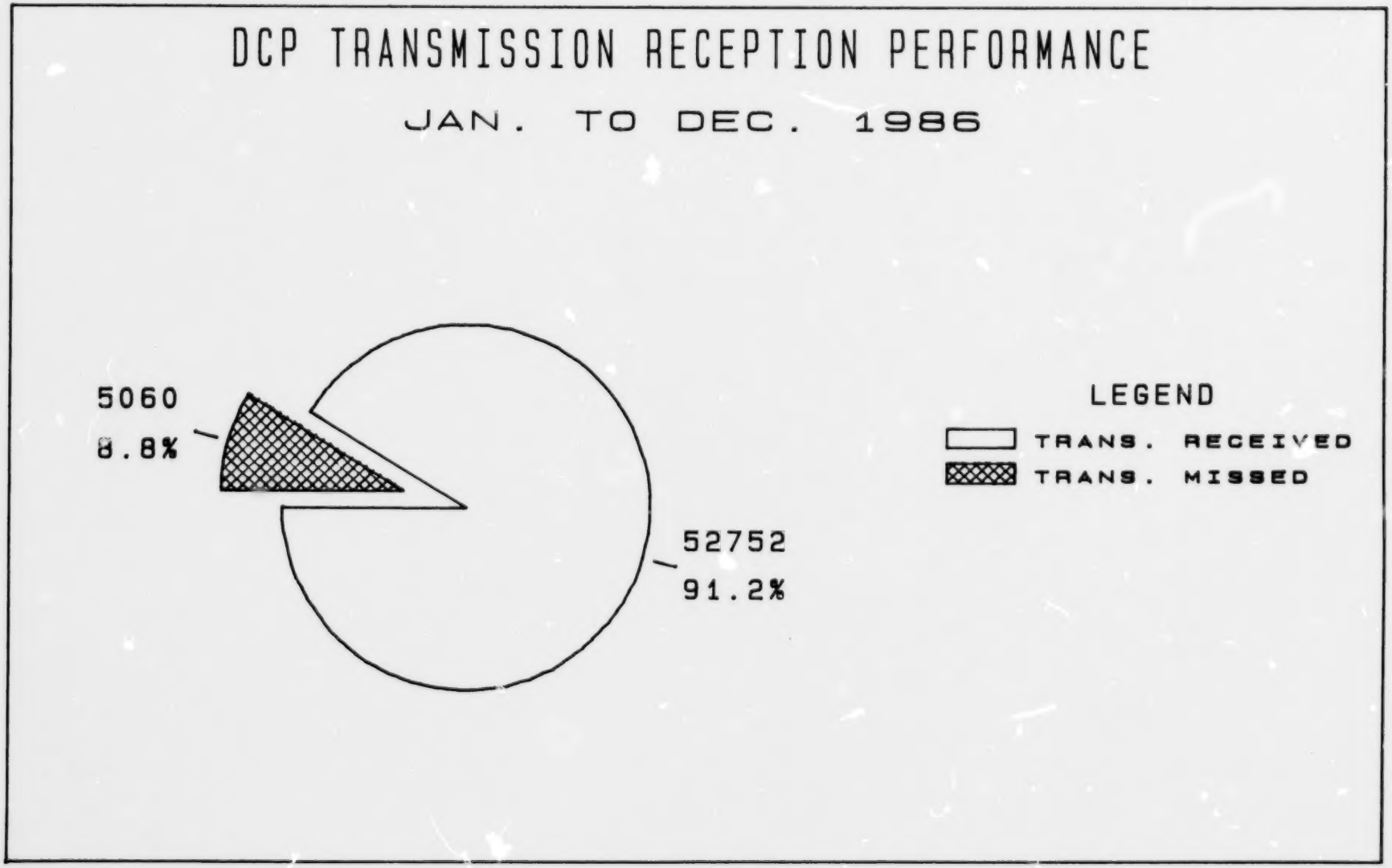
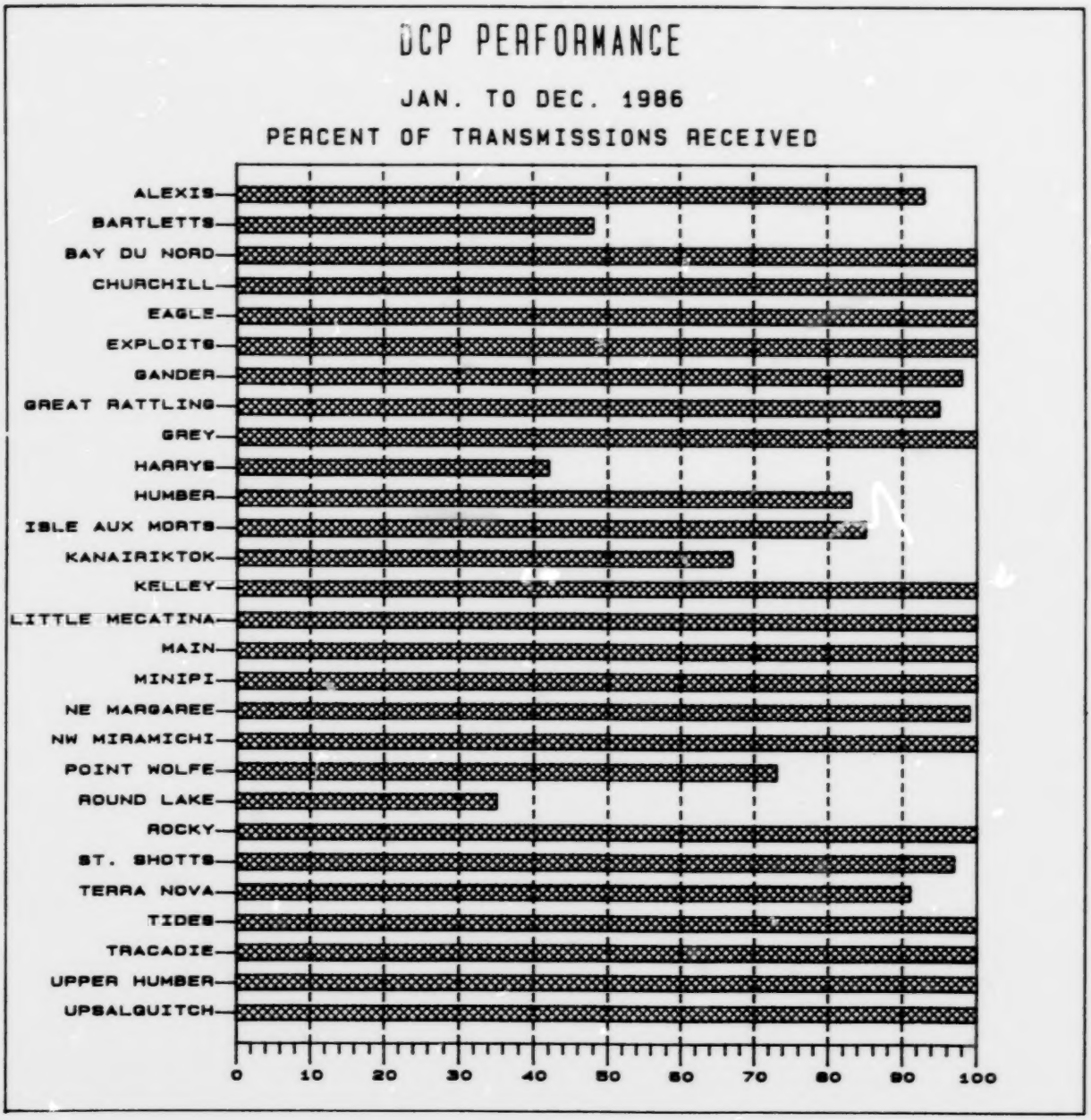

DCP TRANSMISSION RECEPTION PERFORMANCE
JAN. TO DEC. 1986
5060
8.8%
52752
91.2%
LEGEND
TRANS. RECEIVED
TRANS. MISSED

Fig. 1

FIG. VI


DCP PERFORMANCE
JAN. TO DEC. 1986
PERCENT OF TRANSMISSIONS RECEIVED
ALEXIS
BARTLETTS
BAY DU NORD
CHURCHILL
EAGLE
EXPLOITS
GANDER
GREAT RATTLING
GREY
HARRYS
HUMBER
ISLE AUX MORTS
KANAIRIKTOK
KELLEY
LITTLE MECATINA
MAIN
MINIPI
NE MARGAREE
NW MIRAMICHI
POINT WOLFE
ROUND LAKE
ROCKY
ST. SHOTTS
TERRA NOVA
TIDES
TRACADIE
UPPER HUMBER
UPSALQUITCH
0
10
20
30
40
50
60
70
80
90
100

least 80% of the time, and of those 5 cases, one was due to vandalism and one was due to an erroneous diagnostic. The following section gives a brief description of the problems encountered. Only the stations with transmission interuptions are noted. .

INDIVIDUAL DCP PERFORMANCE SYNOPSIS

Alexis River near Port Hope Simpson, Labrador

In January of 1986, a new fully charged battery was installed and this has resulted in the DCP transmitting regularly. Over the year this platform transmitted 93% of the time, a marked improvement over last year when less than 30% of the transmissions were received!

Bartletts River near St. Anthony, Newfoundland

This DCP was installed in early July 1986 and transmitted regularly until vandalism struck in mid September. The antenna was damaged beyond repair and as we were to find out, obtaining a replacement is not a matter of days or weeks but rather months. Several months!

Gander River at Big Chute, Newfoundland

The DCP at this station transmitted 98% of the time. A weak battery, a result of accumulated snow on the solar panel caused a few missed transmissions, but otherwise it performed on a par with last year. Signal strength still only reaches the mid to upper 30s in dB signal strength.

Great Rattling Brook above Tote River Confluence, Newfoundland

The DCP at this station was installed in early July 1986 and transmitted until late August when the battery went dead. A new fully charged battery was installed and this has resulted in regular transmissions since at dB levels hovering around 40.

Harrys River below Highway Bridge, Newfoundland

A first DCP unit was installed at this station in early August 86, and immediate difficulties were encountered. After several field visits it was determined the unit was defective. The unit was sent to Winnipeg for repairs and a replacement unit was installed in late November. Transmissions have been regular since.

Humber River below Highway Bridge, Newfoundland

The DCP at this station was installed in mid July 1986 and from the start there were problems with the power supply. To start with, the first batteries used were not fully charged when first hooked up to the platform. Also the batteries were mistakenly wired in parallel to the solar panel. Once these problems were diagnosed and corrected, the DCP unit started transmitting regularly and at full signal strength.

Isle Aux Morts River below Highway Bridge, Newfoundland

This DCP was installed in mid September 1986 and from the start it did not perform very well. After several unsuccessful servicing visits it was decided to return the unit to Winnipeg for repairs. A replacement was installed early November and the regular transmissions of this unit would seem to confirm the defectiveness of the first platform.

Kanairiktok River below Snegamook Lake, Labrador

The transmission reception rate at this station during the past two years was only in the 30% range until a replacement unit was installed in early August. Afterwards, the transmissions were received regularly until the platform was inadvertantly programmed off the air during a field trip in November. Since this is a remote fly in station the problem would only be rectified on the next

scheduled field visit in March of 1987. This shows the necessity of ensuring a unit is working properly before leaving a remote station. The defective unit was sent to Winnipeg for repairs and was only received several months later.

Northeast Margaree River at Margaree Valley, Nova Scotia

In late January and early February this area of Cape Breton received a major mid winter storm accompanied by extreme temperature fluctuations. This caused the snow to accumulate and crystalize on the solar panel. As a result the battery weakened and transmissions failed. As soon as the snow was removed normal transmissions resumed. Otherwise, the platform has been performing well, as was the case the year before.

Point Wolfe River at Fundy National Park, New Brunswick

This DCP transmitted only 73% of the time during the past year but none of the missed transmissions are for extended periods of time. As was experinced last year, weather, length of antenna cable, and poor location all contribute in lowering the capability of this unit. All practical installation changes have been made and therefore it is believed this unit is producing at its maximum level.

Terra Nova River at Glovertown, Newfoundland

A DCP was installed at this station in early July 1986 and the unit has transmitted regularly. Strong winds caused an antenna realignment and a period of missed transmissions. Once this was corrected the platform resumed transmitting.

Round Lake Brook at Round Lake, Nova Scotia

The Round Lake Brook gauging station was equipped in early March 1986 with a Britol DCP. Along with the regular memomark stage recorder this unit was fitted with a pressure sensing Tavis

transducer. The transducer never operated correctly though it had just been calibrated in Ottawa. After consulting with Hydrometric Methods Section in Ottawa, it was concluded the problem was with the DCP terminal strip and therefore the unit was sent to Winnipeg for repairs. The "Failure Report Form" from the Bristol Aerospace Facility showed showed no faults. Once the DCP was returned, problems occurred with the reinstallation attempt. I/O error messages were thought to indicate a blown fuse but a second check up at the Bristol Facility indicated only power up procedure problems. By mid November the DCP was finally reinstalled and transmission resumed with no problems. This "comedy of errors" caused the platform to be out of operation for over half of the year. On the positive side it provided the field technicians with a "hands on experience" in the use of additional DCP ports and in the diagnosing of installation problems.

St. Shotts River near Trepassy, Newfoundland

Installed in August 1986, the DCP at this station worked well until an ice storm covered the solar panel and the antenna. Once mild weather returned and the ice melted, normal transmissions resumed.

POWER SUPPLY FOR DCPS

Three types of batteries have been and are being used to successfully power the Bristol DCPs in the Atlantic Region. The standard 12-volt car battery is used at 5 stations (mostly in Labrador), the Thermo oil filled battery is used at 3 stations, while 20 stations are now equipped with 2 6-volt Varta batteries hooked in series. During the past year, only two batteries had to be replaced, one a car battery and the other a Varta battery set.

For Newfoundland and Labrador, a Motomaster 30 Amp battery charger was purchased to ensure that batteries with several months on the shelf are periodically recharged. From experience it is necessary to recharge unused batteries after two to three months on the shelf. Also, to adequately check the charge of the battery it is wise to use a hydrometer and measure the specific gravity of the electrolyte solution. With these steps taken, it is felt the initial occasional battery problems are now under control.

The other component of the photovoltaic system used to power the DCPs is the Solarex SX10 solar panel with a nominal voltage of 12. Judging from the performance of the DCPs, these solar collectors are fully capable of maintaining sufficient battery charge, even during shortened Labrador winter days or often sunless conditions prevalent in some Newfoundland coastal areas. Accumulated snow crystalizing on the solar panel and antenna did cause temporary transmission interuptions at a few stations but these problems did not last very long.

There is one area of concern though, which isn't weather related. Since several of the DCPs have been installed in non-remote areas, some of the solar panels and antennas are visible to local residents and therefore are prone to vandalism or theft. The problem, though serious, has only been experienced at a few sites. It is not anticipated this problem will go away and the necessary repairs and replacements will have to be provided when such situations occur. A fact of life!

DCP REPAIR AND MAINTENANCE CONTRACT

The contract negotiated for 18 months with the Bristol Aerospace facility provided for a 10 work day turn around time for repairs to defecive units. In all probability the terms were negotiated in good faith but unfortunately experience has shown that repairs to defective units can require several months. Also, obtaining replacements for antennas is another long wait.

In one instance, there were disagreements over what repairs were covered by the warranty. These differences were eventually worked out but the trade off was the time required before the equipment was finally repaired and returned.

Due to situations like these, it is recommended that management look at the possibility of obtaining and stocking for the Region a spare Bristol Hydromet DCP, Memomark III, antenna, and solar panel.

IMPACT ON FIELD OPERATIONS AND PRODUCTIVITY

Unlike an area such as the Northwest Territories where most of the hydrometric gauging stations are remote and fly in, the hydrometric network in the Atlantic Provinces is mostly accessible by road vehicle year round. The exception is in Labrador and some coastal and interior regions on the Island of Newfoundland. Therefore, the possibility for significantly reducing the field costs as in the northern regions of Canada is not there. Only 8 of the stations in this Region which are remote year round have been equipped with DCPs, and already the number of field trips made to those stations is at a minimum.

With this in mind, the investment of some $160,000 by WRB in real time equipment has to be measured in terms of increased

productivity, in data quality gains, and in a better response to the user need for more timely data. Already, there are indications that the availability of real time water levels in selected representative watersheds is very usefull in planning key highwater field trips, especially in coastal areas where such events can occur almost year round. Quality of data is a long term proposition and if better stage-discharge relationships are achieved through more opportune field coverage, then this will be another plus. As to real time needs, the Atlantic Region is already a leader in producing comprehensive monthly streamflow summaries to a list of established clients. The DCP data received at 8 of the 14 typical stations facilitates the production of these monthly flow summaries and provides a possibility for producing in the future flow condition statements on a more frequent basis.